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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,348	09/11/2003	Zhifeng Ren	2846/2112	5141

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SONNENSCHEIN NATH & ROSENTHAL LLP
FOR PAULA EVANS
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER	
MILLER, DANIEL H	

ART UNIT	PAPER NUMBER
1775	

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/660,348	REN ET AL.	
	Examiner	Art Unit	
	Daniel Miller	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24 and 55-84* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24 and 55-84* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims **1**-5, 9-10, 12, 15-16, 19-23, **55**-57, 60 and 64-67, **68**-70, 72-75, and 77 and 79 and 80 are rejected under 35 U.S.C. 102(e) as being anticipated by Majumdar et al (U.S. 6,996,147).

3. Regarding independent claims 1, 55, and 68, Manjumdar teaches a nanowire with at least two crystalline materials of different composition creating heterostructures (abstract). The crystalline structures can be oxides such as ZnO or CdO (column 31 line 53-68). The structure form in arrays having a structure as depicted in figures 34-35. The figures depict a central spine (nanowire) with terminally attached linear nanostructure rods that are oriented non-parallel; as required in claim 1. Regarding claim 55, there are a plurality (two) three dimensional nanostructures attached to the central nanostructure (see figure 35). Regarding claim 68, the first metal oxide has attached to its end a second metal oxide (figure 35).

4. Regarding claims 2 and 10, the wire has a predetermined 2 fold symmetry (figure 34-35).

5. Regarding claims 3-4, 9 and 12, 56, 69, the nanowire can be entirely ZnO.

6. Regarding claim 5 and 23, 57, 70, the nanowire heterostructure can have a dopant (abstract).

7. Regarding claims 15-16 and 19-20, 62, 64, 77, and 79 the diameter of the nanowire is less than 200 nm (see reference claim 1).

8. Regarding claims 21-22, 65, 73, figure 34 depicts an embodiment where the crystal off shoot is orthogonal to the spine main nanowire while figure 35 depicts an embodiment that is non-orthogonal off-shoot from the spine nanowire.

9. Regarding claims 66-67, 74 and 75, the device can be used to make a microelectronic device, specifically a blue optic device (column 31 line 55-61).

10. Finally, with regards to claims reciting a particular morphology (e.g. claim 4), the crystal structure is a nanowire (abstract).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 8, 13-14, 17-18, 61, 63, 76, 78, 80-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Majumdar.

13. Regarding claim 8, the reference depicts many embodiments of nanostructured nanorods that can comprise any number of segments (column 2 line 17-22, figures 1-

36) some of which would have three distinct oxide compositions (figure 11), or would render the use of three different oxides obvious.

14. Regarding claims 13-14, 17-18, 61, 63, 76, 78, it would be obvious to optimize the nanostructure lengths in order to use the structure as an electrical wiring or in an optical device (see claims); optimizing a known variable through routine experimentation is obvious.

15. Regarding claim 80-84, there are a plurality of metal oxides depicted in figure 35 with three separate branches containing a first and second metal oxide although the figure depicted is silent as to the presence of a network of connected pieces. It would have been obvious to connect a network of nanowires in a variety of configurations in order to create an electrical circuit because there is a need for a broad spectrum of high performance energy conversion devices using nanowires (column 1 line 56-63).

16. Claims 6, 58, and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Majundar in view of Yang (US 2004/0131537).

17. Mujundar, discussed above, teaches there is a need to create a broad spectrum of high performance energy conversion devices using nanowires (column 1 line 56-63), but is silent as to the nanorods being doped with Tin.

18. Yang teaches a nanoribbon used as an actuator that is doped with Tin (abstract).

19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Majundar and dope it with Tin in order to get similar

modifications of p-type oxides in a broad spectrum of high performance energy conversion devices using nanowires.

20. Claims 6, 11 and 58-59 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Majundar in view of Wang (U.S. 6,586,095).

21. Mujundar, discussed above, teaches an optical device but is silent as to the nanorods being formed from Indium Oxide.

22. Wang teaches a Tin-doped oxide nanostructure where the nanostructured oxide is Indium oxide (ITO) are used as films for flat panel displays (column 1 line 18-28).

23. It would have been obvious to a person of ordinary skill I the art to modify the (ITO) material in for use of the optical device of Mujundar in a display device.

Response to Arguments

24. Applicant's arguments with respect to all pending claims have been considered but are moot in view of the new ground(s) of rejection. The previously indicated allowable subject matter has been withdrawn in view of the new art and above rejections.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Miller whose telephone number is (571)272-1534. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571)272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Miller

JENNIFER C. MCNEIL
SUPERVISORY PATENT EXAMINER
3/27/06